

What is claimed is:

5 Sub 5 1. A composite ion selective electrode comprising  
(1) a calcium ion selective electrode member and a  
hydrogen ion selective electrode member,

10 in which the calcium ion selective electrode member  
comprises an electro-insulating support, a pair of elec-  
trode units each of which comprises a silver layer and a  
silver halide layer, and which are electrically separated  
from each other, an electrolyte layer, and a calcium ion  
selective membrane, and

15 in which the hydrogen ion selective electrode member  
comprises an electro-insulating support, a pair of elec-  
trode units each of which comprises a silver layer and a  
silver halide layer, and which are electrically separated  
from each other, an electrolyte layer, and a hydrogen ion  
selective membrane;

20 (2) an electro-insulating member having two openings  
in which one opening is provided for introducing a sample  
liquid into the composite electrode and another opening  
is provided for introducing a reference liquid into the  
composite electrode;

25 (3) a pair of distributing members in which one mem-  
ber distributes the introduced sample liquid to the ion  
selective membrane of each ion selective electrode member  
at a site corresponding to one electrode unit and in  
which another member distributes the introduced reference  
30 liquid to the ion selective membrane of each ion selec-  
tive electrode member at a site corresponding to another  
electrode unit; and

35 (4) a bridge member which is provided on the electro-  
insulating member to bridge the two openings of the  
electro-insulating member so as to electrically connect  
the introduced sample liquid and the introduced reference  
liquid;

FILED " 0432250

which is characterized in that the calcium ion selective membrane has a thickness of 5 to 30  $\mu\text{m}$ , and the hydrogen ion selective membrane contains tri-n-dodecylamine and trisethylhexyl trimellitate.

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2. The composite ion selective electrode of claim 1, wherein the calcium ion selective membrane contains calcium di[4-(1,1,1,3-tetramethylbutyl)phenyl] phosphate.

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3. The composite ion selective electrode of claim 2, wherein the calcium ion selective membrane comprises a vinyl chloride-vinyl acetate copolymer, dioctylphenyl phosphonate, and calcium di[4-(1,1,1,3-tetramethylbutyl)phenyl] phosphate.

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4. The composite ion selective electrode of claim 1, wherein the thickness of calcium ion selective membrane is in the range of 5 to 20  $\mu\text{m}$ .

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5. The composite ion selective electrode of claim 4, wherein the thickness of calcium ion selective membrane is in the range of 10 to 18  $\mu\text{m}$ .

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6. The composite ion selective electrode of claim 1, wherein the hydrogen ion selective membrane has a thickness of 5 to 30  $\mu\text{m}$ .

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7. The composite ion selective electrode of claim 1, wherein the electrolyte layer comprises sodium chloride.

Sub B6

8. A method for determining a standardized calcium ion concentration in a sample blood, which comprises the steps of:

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spotting a sample blood and a reference liquid onto openings of the electro-insulating member of the compos-

ite ion selective electrode of claim 1, respectively;  
measuring potentiometrically a calcium ion concentration and a hydrogen ion concentration in the sample blood; and

5 incorporating the measured calcium ion concentration and the measured hydrogen ion concentration into the following equation to obtain a value of Log (standardized iCa):

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$$\text{Log (standardized iCa)} = \text{Log (iCa at pH)} - 0.22 \times (7.4 - \text{pH})$$

in which iCa means a calcium ion concentration and pH means a hydrogen ion concentration.

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9. A calcium ion selective electrode comprising

(1) a calcium ion selective electrode member which comprises an electro-insulating support, a pair of electrode units each of which comprises a silver layer and a silver halide layer, and which are electrically separated from each other, an electrolyte layer, and a calcium ion selective membrane;

20 (2) an electro-insulating member having two openings which is provided on the calcium ion selective electrode member and in which one opening is provided for introducing a sample liquid into the composite electrode and another opening is provided for introducing a reference liquid into the composite electrode; and

25 (3) a bridge member which is provided on the electro-insulating member to bridge the two openings of the electro-insulating member so as to electrically connect the introduced sample liquid and the introduced reference liquid;

30 which is characterized in that the calcium ion selective membrane has a thickness of 5 to 30  $\mu\text{m}$ .  
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10. The calcium ion selective electrode of claim 9, wherein the calcium ion selective membrane contains calcium di[4-(1,1,1,3-tetramethylbutyl)phenyl] phosphate.

11. The calcium ion selective electrode of claim 10, wherein the calcium ion selective membrane comprises a vinyl chloride-vinyl acetate copolymer, dioctylphenyl phosphonate, and calcium di[4-(1,1,1,3-tetramethylbutyl)-phenyl] phosphate.

12. The calcium ion selective electrode of claim 10, wherein the thickness of calcium ion selective membrane is in the range of 5 to 20  $\mu\text{m}$ .

13. The calcium ion selective electrode of claim 12, wherein the thickness of calcium ion selective membrane is in the range of 10 to 18  $\mu\text{m}$ .

14. The calcium ion selective electrode of claim 10, wherein the electrolyte layer comprises sodium chloride.

15. A hydrogen ion selective electrode comprising  
25 (1) a hydrogen ion selective electrode member which comprises an electro-insulating support, a pair of electrode units each of which comprises a silver layer and a silver halide layer, and which are electrically separated from each other, an electrolyte layer, and a hydrogen ion selective membrane;

30 (2) an electro-insulating member having two openings which is provided on the hydrogen ion selective electrode member and in which one opening is provided for introducing a sample liquid into the composite electrode and another opening is provided for introducing a reference liquid into the composite electrode; and  
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(3) a bridge member which is provided on the electro-insulating member to bridge the two openings of the electro-insulating member so as to electrically connect the introduced sample liquid and the introduced reference liquid;

which is characterized in that the hydrogen ion selective membrane contains tri-n-dodecylamine and tri-ethylhexyl trimellitate.

16. The hydrogen ion selective electrode of claim 15, wherein the hydrogen ion selective membrane comprises tri-n-dodecylamine, triethylhexyl trimellitate, potassium tetrakis(p-chlorophenylborate) and a vinyl chloride-vinyl acetate copolymer.

17. The hydrogen ion selective electrode of claim 15, wherein the hydrogen ion selective membrane has a thickness of 5 to 30  $\mu\text{m}$ .

18. The composite ion selective electrode of claim 15, wherein the electrolyte layer comprises sodium chloride.